A STUDY OF THE PALEODEVONIAN FORMATIONS OF MARYLAND

A DISSERTATION

Submitted to the Board of University Studies of The Johns Hopkins University
in conformity with the requirements for the degree of
Doctor of Philosophy

(ABSTRACT)

BY

RICHARD BURTON ROWE

BALTIMORE
THE JOHNS HOPKINS PRESS
1913

A STUDY OF THE PALEODEVONIAN FORMATIONS OF MARYLAND

A DISSERTATION

Submitted to the Board of University Studies of The Johns Hopkins University
in conformity with the requirements for the degree of
Doctor of Philosophy

(ABSTRACT)

BY

RICHARD BURTON ROWE

ACAD.
LUGD.BAT.
BIBL.

BALTIMORE
THE JOHNS HOPKINS PRESS
1913

Digitized by the Internet Archive
in 2026

https://archive.org/details/IA41547013_0104

A STUDY OF THE PALEODEVONIAN FORMATIONS OF MARYLAND

BY

RICHARD BURTON ROWE[1]

INTRODUCTORY STATEMENT

The dissertation herewith presented is part of a larger contribution submitted in 1900. It has been modified in some particulars, as the result of later work, and is published as part of the Lower Devonian report by the Maryland Geological Survey. The author died in 1902.

Sections of Helderberg Formation

sections of coeymans, new scotland, and becraft members

The following sections display the characteristics of the Coeymans, New Scotland, and Becraft members more fully and will aid the student who desires further acquaintance with the subject. The sections will be treated according to their geographic occurrence beginning with the westernmost exposures in the Cumberland area and proceeding thence eastward.

I. Section at Keyser, West Virginia

An excellent exposure of the entire Helderberg is seen in the quarry of the Standard Lime and Stone Company, east of Keyser, West Virginia. The following section is continuous with the beds of the Keyser member described on a preceding page.

Oriskany Formation

Shriver Chert Member

Siliceous shale containing numerous chert nodules.

[1] Manuscript submitted June, 1900.

HELDERBERG FORMATION

New Scotland Member	Vertical thickness feet
Fissile drab shale	14.0
Gray limestone and interbedded white chert. The chert is in layers 6 to 9 inches thick and forms almost the entire unit. 4.6 feet and 3.6 feet above the base of the unit occurs *Spirifer macropleurus*, at 1.6 feet *Meristella arcuata*	21.5
Medium-bedded gray limestone with some chert layers. 4.5 feet above the base of the unit occur *Phacops logani*, *Dalmanella perelegans*, *Schuchertella woolworthana*, *Spirifer macropleurus*	5.1
Shale much weathered	0.2
Black speckled crinoidal limestone, rather coarse grained with one chert layer	1.1
Thickness of New Scotland member	41.9

Coeymans Member	
Thin-bedded gray crinoidal limestone, with one chert band. At middle of unit occurs *Strophonella leavenworthana*	2.5
Shaly limestone, with a chert layer	1.0
Shale weathered to clay	0.5
Massive gray crinoidal bed with one 6-inch bed of chert	3.5
Massive gray crystalline limestone. Between 2 and 2.7 feet above base of unit are a number of bands of sand which weather out as brown ridges. At base of the unit occur *Atrypa reticularis*, *Gypidula coeymanensis* (a), *Schuchertella woolworthana*, *Stropheodonta* sp., *Lioclema subramosum*	6.8
Thickness of Coeymans member	14.3

II. Section at 21st Bridge

An excellent section of the Oriskany formation and of the New Scotland member of the Helderberg is seen in the axis of a small anticline that is cut by the Potomac River opposite 21st Bridge, Maryland, on the West Virginia side, along the tracks of the Baltimore and Ohio Railroad. The New Scotland shale is well exposed. The New Scotland limestone appears thicker than usual leading Schuchert to estimate its thickness at 44 feet[1] at this place. This appearance is, however, misleading as some of the beds are duplicated by a thrust fault seen along the river so that it is probable that the thickness of the beds is the same as at Keyser and Dawson.

[1] Proc. U. S. Nat. Mus., vol. xxvi, 1903, p. 422.

Oriskany Formation

Shriver Chert Member

Vertical thickness feet

Siliceous shale containing much black chert in nodules.

Helderberg Formation

New Scotland Member

Soft, bluish, argillaceous shales, with some harder layers and occasional manganese-phosphatic nodules. *Chonetes helderbergiæ, Meristella arcuata, Trematospira multistriata, Spirifer macropleurus, Schuchertella woolworthana, Stropheodonta becki*, etc..... 20.0

Massive gray limestone with bands of chert, becoming thin-bedded above, with partings of shale; characterized by *Spirifer macropleurus* and containing *Hindia sphæroidalis, Edriocrinus pocilliformis, Dalmanella perelegans, Rhipidomella oblata, Eatonia singularis, E. peculiaris, E. medialis, Anoplotheca concava, Trematospira multistriata, Parazyga dewyi, Spirifer perlamellosus, S. macropleurus, S. cyclopterus, Platyceras spirale, Phacops logani*, etc.

Concealed.

III. Section at Dawson

An excellent section of the New Scotland and Coeymans limestone is exposed at the south end of Fort Hill, near Dawson, along the tracks of the Baltimore and Ohio Railroad. The Oriskany sandstone forms the "backbone" at the south end of the mountain and is succeeded by a small covered interval. Immediately east of this the limestone beds of the New Scotland are seen and below them the Coeymans and upper part of the Keyser member. This exposure affords one of the finest sections of the New Scotland and Coeymans limestones in the State.[1] It is continuous with that of the Keyser member described on a preceding page.

Oriskany Formation

Massive sandstone at south end of Fort Hill.

Concealed.

Helderberg Formation

New Scotland Member

Concealed. Interval occupied by shale.

---

[1] Measured by C. K. Swartz, assisted by J. B. Reeside, Jr. The figures following the names of the fossils indicate the altitudes in feet at which they occur above the base of the units.

	Vertical thickness feet	Total vertical thickness
Gray limestone and interbedded white chert. The chert is in layers six to nine inches thick and forms almost the entire unit. *Schuchertella woolworthana* and *Spirifer perlamellosus* occur throughout, *Rhipidomella oblata*, 16.8; *Spirifer macropleurus*, 16.8, 4.8; *Trematospira multistriata*, 16.3; *Meristella arcuata*, 16.3, 4.8, 2.8 (a), 0.3; *Leptæna rhomboidalis*, 16.3, 4.8; *Streptelasma strictum* (a), *Monotrypa sphærica*, *M. tabulata*, *Dalmanites pleuroptyx*, *Phacops logani*, *Eatonia medialis*, 16.3; *Stropheodonta* sp., 14.8; *Platyceras* sp., *Anoplotheca concava*, *Nucleospira ventricosa*, *Eatonia medialis*, *Trematospira deweyi*, 8.8; *Dalmanella perelegans*, *Trematospira equistriata*, *Strophonella undaplicata*, 4.8	21.0	29.3
Medium-bedded gray limestone with a chert layer near the middle of the unit. *Dalmanites pleuroptyx*, *Schuchertella woolworthana*, *Leptæna rhomboidalis*, *Dalmanella perelegans*, *Meristella arcuata*, *Rhipidomella oblata* occur abundantly throughout the unit. *Aviculopecten communis*, *A. textilis*, cf. *Leptostrophia* sp., *Stropheodonta arata*, 5.1; *Phacops logani*, *Schizophoria multistriata* ? and *Strophonella undaplicata*, 3.6; *Spirifer macropleurus* and crinoids, 1.6; *Fenestella idalia*, *Actinopteria communis* (a), *Strophonella leavenworthana*, *Callotrypa macropora*, 0.8; *Vermipora* sp., *Chonostropia helderbergiæ*, *Fenestella idalia*, *Anaplotheca concava* (a), *Spirifer cyclopterus*, *Eatonia medialis*, *Leptostrophia planulata*, *Strophonella leavenworthana*, *Strophonella punctulifera*, *Spirifer perlamellosus*, *Strophonella undaplicata*, 0.6; *Spirifer cyclopterus*, *Eatonia medialis*, *Strophonella leavenworthana* at the base of the unit	5.8	8.3
Thin-bedded, gray crystalline limestone with several chert layers. *Spirifer perlamellosus*, 2.1, 1.1; *Orthostrophia strophomenoides* and bryozoa, 1.6; *Fenestella idalia*, *Dalmanites pleuroptyx* (a), *Leptæna rhomboidalis* (a), *Actinopteria communis* (a), *Chonostrophia helderbergiæ* (aa), *Rhipidomella oblata*, *Schuchertella woolworthana*, and *Strophonella leavenworthana*, 1.1	2.5	2.5
Thickness of New Scotland member exposed	29.3	
Coeymans Member		
Thin bed of gray crystalline limestone with a chert layer	0.7	13.6
Shale parting	0.1	12.9
Heavy bed of crinoidal limestone with a chert layer near middle and at base. At base of unit occur *Leptænisca concava*, *Actinopteria communis*, *Tentaculites elongatus*, *Gypidula coeymanensis* (a), *Rhipidomella* sp., *Stropheodonta arata*, *Strophonella leavenworthana*, *Strophonella punctulifera*, 1.9; *Gypidula coeymanensis*, *Leptæna rhomboidalis*, 2.4	3.0	12.8

	Vertical thickness feet	Total vertical thickness
Massive bed of gray crystalline limestone. Between 2.6 and 3 feet below the base of the unit are a number of bands of sand which weather out as brown ridges on the surface. At the base of the unit are rounded limestone fragments, about 2 to 4 inches in thickness. The line of contact with the Keyser is rather sinuous. 6.8 feet above the base is a *Stromatopora* bed. *Dalmanites pleuroptyx*, *Gypidula coeymanensis*, *Atrypa reticularis*, *Schuchertella woolworthana*, *Leptæna rhomboidalis* and *Stropheodonta arata* occur in abundance throughout; corals, *Spirifer cyclopterus*, *Rhipidomella oblata*, *Strophonella leavenworthana*, *Strophonella punctulifera* occur at top of unit; chætetoid bryozoa *Stropheodonta planulata*, crinoid rings, *Uncinulus* sp., 8.3; *Spirifer cyclopterus*, 3.0 feet; *Stromatoporoid* sp., *Favosites helderbergiæ*, Fenestelloid bryozoa *Uncinulus* sp., 2.6	9.8	9.8
Thickness of Coeymans member	13.6	

Keyser Member

For description see pages 137-138.

IV. Section at Riverside Station

One of the most conspicuous cliffs along the Potomac River is in Knobly Mountain, West Virginia, east of Potomac Station. It is something over a thousand feet high and the Helderberg and Tonoloway formations are well exposed. The escarpment is most easily reached from Riverside Station on the West Virginia Central Railroad.

TONOLOWAY FORMATION

High up the hill, which is largely covered at this place, although well exposed a little farther south, is a cliff of thin-bedded limestones from 75 to 100 feet high. This escarpment is very conspicuous and about one-half or three-quarters of the distance to the top of the mountain. Along the top of the escarpment the Tonoloway formation is found. Several specimens of *Tentaculites gyracanthus*, *Leperditia alta*, *Beyrichias*, *Pelecypoda*, small *Meristella* and *Rhynchospira* of the Tonoloway formation of this region were obtained.

For some distance back from the top of this cliff the ground is level.

Helderberg Formation

Near the bottom of the next ascent is a ledge 5 feet thick of the compact massive gray nodular limestone of the Keyser member.

At the top of the rise and crowning the brow of the hill with a cliff from 30 to 40 feet high is the compact gray limestone of the New Scotland member with numerous layers of white chert, dipping quite perceptibly to the southeast.

On the very top of the cliff *Spirifer macropleurus* is common occurring chiefly in the white chert.

Oriskany Formation

The Oriskany is shown some distance to the eastward farther down the slope. This escarpment forms the highest part of the mountain.

The fossils obtained in the New Scotland limestone are: *Spirifer macropleurus* (a), *S. perlamellosus* (r), *Uncinulus vellicatus* (rr), *Leptæna rhomboidalis* (c), and *Rhipidomella oblata* (rr).

V. Section at Cedar Cliff

The cliffs in Knobly Mountain at Cedar Cliff are almost as imposing as those at Riverside. The tracks of the Western Maryland Railroad run along the base of this exposure. The section is as follows according to the measurement of R. B. Rowe.

Oriskany Formation	Vertical thickness feet	Total vertical thickness
Top of Knobly Mountain, concealed	110.0	320.0
Helderberg Formation		
New Scotland, Coeymans and Keyser Members		
Light gray massive limestone with bands of light colored chert at the top	210.0	210.0

The upper part of the New Scotland member stands out in a bold cliff near the very top of the mountain. The fossils are shown here along its upper surface as at Riverside, including: *Spirifer macropleurus, S. perlamellosus, Meristella arcuata, Nucleospira ventricosa, Schuchertella woolworthana, Stropheodonta becki, Eatonia medialis,* and *Uncinulus abruptus.*

The Helderberg formation is exposed on the west side of Knobly Mountain at Miller's Spring, immediately south of the tunnel of the Western Maryland Railroad. The occurrence of fossils in the Keyser member at this place has already been discussed. The following fossils were obtained by Rowe from loose blocks of New Scotland limestone at this locality: *Atrypa reticularis* (rr), *Spirifer perlamellosus* (c), *Strophonella leavenworthana* (rr), *Leptænisca concava* (rr), *Leptæna rhomboidalis* (aa), *Schuchertella woolworthana, Chonetes subacutiradiatus* (rr), *Dalmanella perelegans* (rr), *Rhipidomella oblata* (r).

VI. Section at Devil's Backbone

This locality affords one of the finest sections of the Helderberg formation in the entire State. An uninterrupted exposure extends from the base of the Keyser member to the top of the New Scotland limestone. The section described[1] is continuous with that of the Keyser member given on a preceding page to which reference should be made for a further account of this locality. It is also continuous with the section of the Oriskany given on a subsequent page.

Helderberg Formation

New Scotland Member	Vertical thickness feet	Total vertical thickness
Concealed. The concealed interval consists of fissile gray shale.		
Gray crystalline limestone with interbedded white chert. The latter forms almost the entire thickness of the unit and is in courses 6 to 9 inches thick. *Rhipidomella oblata* and *Spirifer perlamellosus*, 4.4, *Schizophoria multistriata*.....	13.0	34.0
Gray crystalline limestone with several chert layers.....	2.0	21.0
Medium-bedded gray limestone with but few chert layers. *Dalmanites pleuroptyx, Leptæna rhomboidalis, Dalmanella perelegans, Meristella arcuata* occur abundantly throughout, and less abundant but common are *Spirifer cyclopterus, S. perlamellosus, Rhipidomella oblata, Schuchertella woolworthana, Fenestella idalia*, 2.4, 2.9; *Orthopora rhombifera*, 2.9; *Orthopora regularis*, 2.9; *Monotrypa tabulata*, 2.9; *Stropheodonta arata* occurs at 8.4, 4.9, 3.8; *Spirifer macropleurus*, 7.9, 6.7, 6, 3.7		

[1] Measured by C. K. Swartz and assistants. The figures following the names of the fossils indicate the altitude in feet above the base of the units at which they were found.

	Vertical thickness feet	Total vertical thickness
(?); *Stropheodonta planulata*, 6.7, 3.8; *Orbiculoidea* sp., 6; *Eatonia medialis*, 4.9, 4.3; *Lichenalia* sp., 4.3, 3.8, 2.9, 2.4, 2; *Strophonella leavenworthana*, 4.3, 3.8, 2.9, 2.4, 2, 0.4 feet; *Strophonella punctulifera*, 3.8, 2.9; *Uncinulus* sp., 2.9; *Cyathophylloid* coral and *Uncinulus nucleolatus*, 2.9; *Leptænisca concava*, 2.4; *Actinopteria cummunis* and *Tentaculites elongatus*, 2.8; *Chonostrophia helderbergiæ*, 2; *Atrypa reticularis* and *Dalmanella eminens* at 0.4; crinoids, 3.8. Near base occur *Anoplotheca concava* (aa), *Spirifer cyclopterus*, *Schuchertella woolworthana* with fine striæ, *Cypricardinia* cf. *sublamellosa*, *Tentaculites* sp., *Leptæna rhomboidalis*	9.6	19.0
Yellow shale. *Spirifer perlamellosus*	0.8	9.4
Thickness of New Scotland member exposed	25.4	

Coeymans Member

Medium-bedded gray limestone with a chert layer at top of unit. *Gypidula coeymanensis* (aa), *Dalmanella perelegans*, *Spirifer cyclopterus*, *Leptæna rhomboidalis*, *Strophonella leavenworthana* occur throughout. At the top are found *Strophonella punctulifera*, *Meristella* sp., *Schuchertella woolworthana* with fine striæ; and *Atrypa reticularis*	2.6	8.6
Single bed of massive gray limestone weathering to a ridge which stands out as the "Backbone." Chert layers 6 inches thick at top and near middle. Limestone pebbles at base. *Gypidula coeymanensis*, *Leptæna rhomboidalis*, *Atrypa reticularis* occur abundantly throughout; *Strophonella punctulifera*, 5.9, 2.9; *Dalmanites pleuroptyx*, *Strophonella leavenworthana*, *Dalmanella perelegans*, 5.9; *Rhipidomella* sp., *Schuchertella woolworthana*, 4.9; *Uncinulus* sp., 3.9; *Cyrtoceras* n. sp., *Nucleospira ventricosa*, *Spirifer cyclopterus*, *Stropheodonta coeymanensis*, *Stropheodonta arata*, and *Uncinulus* sp., 1.9 feet. Lepadocrinus stems abundant	6.0	6.0
Thickness of Coeymans member	8.6	

Keyser Member

VII. Sections at Corriganville

Two additional sections are exposed at Corriganville. One of these is on the south side of the creek opposite the Devil's Backbone in an abandoned quarry from which the rock has been taken out for a distance of 100 or 200 feet back from the hill-slope. The lower part of the New

Scotland member, the Coeymans, and a part of the Keyser member have been worked. On the western face of the quarry and on many of the slabs which have fallen down are splendid exposures, showing hundreds of specimens of *Spirifer macropleurus*. They are imbedded in the white chert which weathers in such a way that the internal structure of the fossils is finely shown. They cannot be taken from the chert, however, without destroying them since they have all been more or less silicified.

The following fossils were obtained by R. B. Rowe at this place: *Spirifer macropleurus* (aa), *S. perlamellosus* (a), *Trematospira multistriata* (r), *T. deweyi* (rr), *T. equistriata* (r), *Anoplotheca concava* (aa), *Meristella arcuata* (r), *Nucleospira ventricosa* (r), *Leptæna rhomboidalis* (a), *Strophonella punctulifera* (rr), *S. headleyana* (rr), *Schuchertella woolworthana* (r), *Dalmanella planoconvexa* (r), *D. perelegans* (r), *D. emarginata* (r), *Rhipodomella oblata* (r), *Orthostrophia strophomenoides* (rr), *Schizophoria multistriata* (c), *Eatonia medialis* (r), *E. singularis* (r), *Camarotœchia altiplicata* (rr), *Uncinulus vellicatus* (r), *U. globosus* (rr), *Rhynchonella bialveata*.

An excellent and uninterrupted exposure of the rocks of the Lower Oriskany, New Scotland, Coeymans, and the larger part of the Keyser is seen in the deep cut of the Pittsburg branch of the Western Maryland Railroad through the hill south of the quarry. The beds of the Keyser member have already been described. The following section of the Coeymans and New Scotland is exposed at this place:[1]

	Vertical thickness feet	Total vertical thickness
Oriskany Formation		
Shriver Chert Member		
Siliceous shale containing chert nodules.		
Helderberg Formation		
New Scotland Member		
Fissile drab shale	20.0	54.2
Shale with several chert layers	1.5	34.2
Gray crystalline limestone with interbedded white chert. The chert is in 6-inch layers and makes up nearly the entire		

[1] Measured by C. K. Swartz and assistants. The figures following the names of the fossils indicate the altitude in feet at which they occur above the base of the units.

	Vertical thickness feet	Total vertical thickness
thickness of the unit. *Leptæna rhomboidalis* occurs throughout the unit; *Stropheodonta planulata and Schuchertella woolworthana* (a), 11; *Strophonella undaplicata*, 5; *Spirifer macropleurus*, 6.5; *S. perlamellosus* and *S. macropleurus*, 4.5; *Eridotrypa corticosa, Fenestella idalia, Polypora compacta, Orthopora regularis, Stictopora ? papillosa, Orthopora rhombifera*, 3.0; *Spirifer macropleurus*, 1.8	11.5	32.7
Medium-bedded crystalline limestone with several chert layers. *Leptæna rhomboidalis, Dalmanella perelegans* and *Schuchertella woolworthana* occur throughout the unit; *Anoplotheca concava* is abundant at the top and the base; *Stropheodonta planulata, Spirifer cyclopterus, Strophonella leavenworthana*, 2.5; *Schuchertella woolworthana* var. with fine striæ *Proëtus* cf. *protuberans, Stropheodonta planulata, Meristella arcuata, Rhynchospira globosa* at base	3.5	21.2
Medium-bedded, crystalline limestone with but little chert. *Leptæna rhomboidalis* occurs throughout; *Dalmanites pleuroptyx* and *Rhipidomella oblata*, 6; *Schuchertella woolworthana, Spirifer cyclopterus* 4; *Anoplotheca concava* 3 (a)	7.5	17.7
Shale. *Anoplotheca concava* (a) and *Spirifer cyclopterus*	1.0	10.2
Thickness of New Scotland member	45.0	

Coeymans Member

Dark blue crystalline limestone, very massive and very fossiliferous. Lower surface of unit somewhat irregular. At top occur *Schuchertella woolworthana* with fine striæ; *Actinopteria communis* (?), *Spirifer cyclopterus, Gypidula coeymanensis, Leptæna rhomboidalis, Strophonella leavenworthana, S. punctulifera*, 6; *Meristella* sp., *Dalmanella* sp., 4; *Gypidula coeymanensis, Actinopteria communis* (?), *Stropheodonta planulata, Atrypa reticularis, Spirifer cyclopterus, Uncinulus nucleolatus* ? at base	9.2	9.2
Thickness of Coeymans member	9.2	

VIII. Section near Warren Point

Cove, or Tuscarora Mountain, is an anticline whose harder beds pass beneath the surface about a mile south of the Maryland-Pennsylvania boundary. Licking Creek cuts through its southern end almost on the State line, about 8 miles northeast of Hancock. At this place one of the finest sections of Upper Silurian and Lower Devonian rocks of this region

is exposed. By following the road west of Warren Point along Licking Creek, the Tonoloway, Helderberg, and Oriskany are finely exposed while the Clinton outcrops on the south bank of the creek a little farther west.

The Lower Devonian undergoes a rapid change between Hancock and Warren Point. At Hancock the divisions still show many of the characteristics observed in the Cumberland area. At Warren Point the Oriskany is greatly reduced in thickness, being only 52 feet thick instead of over 400 feet thick as at Tonoloway, and its lithological and faunal characters are greatly changed. The Becraft, absent west of this place, appears in force, the New Scotland and Keyser become thinner while the Coeymans is a sandstone. All of these features indicate differences in the conditions of sedimentation.

The following section is exposed on the south side of Licking Creek beginning at the iron bridge and extending westward.[1]

	Vertical thickness feet	Total vertical thickness
Oriskany Formation		
Cherty arenaceous limestone. *Spirifer arenosus, S. murchisoni, Meristella lata, Rensselæria marylandica.*		
Helderberg Formation		
Becraft Member		
Light gray limestone free of chert. *Spirifer concinnus* (aa), *S. cyclopterus* (a), *Meristella arcuata* (c), *Anoplotheca concava* (rr), *Rensselæria subglobosa* (aa), *Plethorhyncha campbellana* (aa), *Eatonia medialis, E. singularis* (r), *E. peculiaris* (rr), *Leptæna rhomboidalis* (rr), *Schuchertella woolworthana* (aa), *Strophonella punctulifera* (r), *Rhipidomella oblata* ? (r).....	25.0	162.0
Light gray limestone with numerous bands of black chert....	20.0	137.0
Almost pure light gray limestone with a few nodules and one or two layers of chert. *Spirifer concinnus* (aa), *Rensselæria subglobosa* (c), *Plethorhyncha campbellana* (r), *Eatonia medialis* (r), *Schuchertella woolworthana* (r).....	25.0	117.0
Mostly black chert in irregular nodular layers, some limestone near the top.....	17.0	92.0
Talus slope. Fossils from the higher zones: *Spirifer concinnus* (aa), *S. perlamellosus* (rr), *Anoplotheca concava* (rr), *Meristella arcuata* (a), *Rensselæria subglobosus* (c), *Eatonia peculiaris* (r), *E. medialis* (r), *Plethorhyncha campbellana*		

[1] Measured by R. B. Rowe.

	Vertical thickness feet	Total vertical thickness
(rr), *Strophonella punctulifera* (rr), *Stropheodonta planulata* (r), *Leptæna rhomboidalis* (c), *Schuchertella woolworthana* (c), *Rhipidomella oblata* (r), *Tentaculites elongatus* (rr).....	40.0	75.0
Thickness of Becraft member.....	127.0	

New Scotland Member

Light gray limestone with very numerous layers of light colored almost white chert at the bottom. Blacker near the top. *Spirifer macropleurus* (a), *Meristella arcuata* (c), *Strophonella punctulifera* (r), *Leptæna rhomboidalis* (a).....	25.0	35.0
Thickness of New Scotland member.....	25.0	

Coeymans Member

Light gray almost quartzitic sandstone, crinoid stems.....	10.0	10.0
Thickness of Coeymans member.....	10.0	

The Becraft member is well developed and sharply defined both lithologically and paleontologically. It is at least 87 feet thick and it may possibly be over 100 feet, and much thicker than it is in the typical New York section and nearer to that of the Port Jervis, New York, section.[1]

The New Scotland member is about 25 feet thick and contains much white chert. The Coeymans member is an almost white qaurtzitic sandstone, a feature not known in the Helderberg of Maryland west of this point. This pure sandstone is probably caused by the carrying away by infiltrating waters of the calcareous cementing material and its replacement by a siliceous cement. This sandstone was long believed to be Oriskany and mapped as such. Later it was considered New Scotland by Rowe and Ulrich and Stose. It has more recently been shown to be of Coeymans age by Swartz who found a characteristic Coeymans fauna in it. The following fossils were collected on the road crossing the crest of Elbow

[1] Barrett, S. T. Ann. N. Y. Lyceum Nat. Hist., vol. xi, 1876, pp. 290-299.

Ridge just south of the Maryland-Pennsylvania line: *Gypidula coeymanensis* (a), *Leptæna rhomboidalis* (a), *Strophonella punctifera, Rhipidomella oblata ?, Dalmanella* sp., *Pleurodictyum lenticulare, Favosites helderbergiæ.* It is interesting to note that a thin sandstone occurs near the base of the Coeymans at a number of localities west of Cumberland, a feature best seen at Dawson.

IX. Section at Ernstville

At Ernstville opposite Cherry Run, about one-half mile north of the canal, is an abandoned quarry in which the upper part of the Helderberg and the Oriskany are shown. There is a broad, low anticline which strikes across the river at this place appearing along the Baltimore and Ohio Railroad on the south side of the Potomac, a short distance west of Cherry Run. It then disappears rapidly beneath the younger rocks to the southward. The section is as follows, according to the measurements of R. B. Rowe:

	Vertical thickness feet	Total vertical thickness
Helderberg Formation		
Becraft Member		
Light gray massive limestone with many chert bands. Fossiliferous. *Spirifer concinnus* (rr), *Rensselæria subglobosa* (r), *Schuchertella woolworthana* (aa), *Rhipidomella oblata* (a)....	20.0	42.0
Dark bluish-gray massive limestone with occasional layers of black shale. Limestone layers are about 4 feet thick with shale beds between. Very fossiliferous. In massive layers and nodules of chert are *Spirifer cyclopterus* (aa), *S. perlamellosus* (r), *Nucleospira ventricosa* (c), *Uncinulus vellicatus* (a), *Eatonia singularis* (rr), *Plethorhyncha præspeciosa* (r), *Leptæna rhomboidalis* (a), *Rhipidomella oblata* (r), *Edriocrinus pocilliformis* (aa), *Streptelasma strictum* (r), *Aulopora schohariæ*	22.0	22.0
Thickness of Becraft member exposed.....	42.0	

In the quarry and on the talus slopes above are blocks of chert with Oriskany fossils, large blocks of conglomeratic sandstone that must have come from the top of the Oriskany, and some boulders of limestone with Oriskany fossils.

There is scarcely room for more than 25 feet of Oriskany here. None is seen in place and the Romney shale occurs in such proximity that the Oriskany cannot be very thick.

X. Section at Cherry Run, West Virginia

A much greater section of the Lower Devonian is exposed on the south side of the river on the Baltimore and Ohio Railroad about ¾ of a mile west of Cherry Run. Here the river and railroad have both tended to strip the rocks of their covering. The most conspicuous part of this section is its lower member which forms a cliff 40 to 60 feet high, directly along the railroad track. The fossils are not plentiful and are difficult to obtain. The following section was measured by Charles Schuchert.

	Vertical thickness feet	Total vertical thickness
Oriskany Formation		
Light gray limestone. *Spirifer arenosus* (c), *S. murchisoni* (aa), *Anoplotheca flabellites* (aa), *Rensselæria marylandica* (r)	10.0	160.0
Helderberg Formation		
Becraft Member		
Dark blue arenaceous limestone with lumps of black chert. The fauna is most abundant in the upper half. *Rensselæria subglobosa, Anoplotheca flabellites, Spirifer cyclopterus, S. concinnus, Cyrtina rostrata, Eatonia medialis, E. peculiaris* (r), *Uncinulus vellicatus, Rhipidomella assimilis*	85.0	150.0
Thickness of Becraft member	85.0	
New Scotland Member		
Gray heavy bedded limestone with chert. Mostly covered	50.0	65.0
Light gray cherty limestone. *Spirifer macropleurus* (aa), *S. cyclopterus* (aa), *S. perlamellosus* (a), *Trematospira equistriata* (rr), *Anoplotheca concava* (r), *A. flabellites* (r), *Rhipidomella oblata* (r), *Dalmanella perelegans* (r), *D. eminens* (r), *Streptelasma* (?), *Atrypina imbricata* (rr), *Eatonia singularis* (?), *Leptæna rhomboidalis* (r), *Uncinulus vellicatus* (c), *Camarotœchia altiplicata* (r)	15.0	....
Thickness of New Scotland member exposed	65.0	

Hindia sphæroidalis, Streptelasma strictum, Favosites conicus, Striatopora bella, Aulopora schucherti were found in the New Scotland in the woods south of the cut.

In the North Mountain at the eastern end of the cut on the Baltimore and Ohio Railroad at the watchman's hut is a limited but good exposure of the Becraft member of the Helderberg formation. About 15 feet are exposed. To the west of this section the Romney shale is seen. The limestone is light gray and the siliceous fossils weather out and are found in the dirt under the cliff. The following species were secured here: *Favosites conicus, Spirifer concinnus* (r), *S. cyclopterus* (r), *S. perlamellosus* (rr), *Nucleospira elegans* (rr), *N. ventricosa* (rr), *Meristella arcuata* (rr), *Eatonia peculiaris* (c), *Uncinulus abruptus* (rr), *U. vellicatus* (r), *Rhipidomella assimilis* (aa), *Edriocrinus pocilliformis* (rr), *Favosites conicus* (a).

Sections of Oriskany Formation

The following sections show the characteristic features of the Oriskany. They are considered in the order of their geographic occurrence from the west to the east.

I. Section at Monster Rock

At Monster Rock opposite Keyser is an overturned fold exposed in the cut of the West Virginia Central Railroad. The first bed of the section lies to the west, with the second and third above it in regular order. This condition, however, is soon altered for the older rocks rapidly bend over to the eastward and resume their normal position. The thickness of the Oriskany here appears low in comparison with that at 21st Bridge where the opportunity of measuring it is better. The disturbance at the Oriskany-Romney contact may account for this. The section is as follows according to the measurements of R. B. Rowe:

Romney Formation

Onondaga Member

Fine black shale. Oriskany-Romney contact at base.

ORISKANY FORMATION

	Vertical thickness feet	Total vertical thickness
Ridgely Sandstone Member		
Light gray quartzitic sandstone dipping from 60° to 67° to the eastward. There is considerable disturbance at the Oriskany-Romney contact but the thickness cannot be less than 210 feet. *Spirifer arenosus* (r)	210.0	277.0
Shriver Chert Member		
Black nodular chert with gray shale partings. *Anoplotheca flabellites* (r), *Spirifer tribulis* (rr), *Meristella lentiformis* ? (r), *Chonetes hudsonicus* (r)	67.0	67.0

II. Section at 21st Bridge

On the West Virginia side of the Potomac River at 21st Bridge, the Baltimore and Ohio Railroad cuts across an anticline of Oriskany giving an exposure from the New Scotland member of the Helderberg to the very top of the Oriskany. The exposure is clean cut and complete, showing the contact between the Helderberg and the Oriskany. Of the latter there are few better exposures in Maryland. At the west side of the cut near the bridge the rocks lie quite horizontal and gradually dip as one goes away from the bridge until the top of the Oriskany lies at a very high angle. The section as worked out by Schuchert and Rowe is as follows:

ORISKANY FORMATION

	Vertical thickness feet	Total vertical thickness
Ridgely Sandstone Member		
Heavy-bedded arenaceous limestone, gradually changing downward into a black chert or siliceous shale. In the lowest beds are found *Spirifer cumberlandiæ*, *S. concinnoideus*, and *Eatonia sinuata*. Fossils, however, are rare until 100 feet above the base of this division, where the characterizing Hipparionyx fauna attains greater individual and specific representation, culminating in the upper 100 feet	258.0	328.0
Shriver Chert Member		
Bedded and nodular chert and siliceous shale, with a sparse fauna distinct from the Hipparionyx fauna above and from the Helderbergian below. Near the base are found *Anoplotheca flabellites* (aa), *Stropheodonta arctimuscula* (r), and Ostracoda. Just below the middle occur *Anoplotheca flabellites* (c), *Spirifer tribulis* (c), *S. paucicostatus*, *Beachia suessana* var. *immatura*, *Anoplia nucleata*, *Pholidops multilamellosa*, *Tentaculites aculus* and *Diaphorostoma desmatum*. Near the top is an abundance of ostracoda and some *Chonetes hudsonicus*	90.0	90.0

Helderberg Formation

New Scotland Member

Cherty limestone.

In a cut on the Georges Creek and Cumberland Railroad, just east of Winchester Road Station, the black chert beds of the Shriver Chert member of the Oriskany are exposed. The chief features of this exposure are the weathered condition in which the chert is found and the ease with which the fossils may be obtained from it. It is the best locality for Lower Oriskany fossils in this region. The chert is found at the east end of the cut, weathered into arenaceous beds which are highly colored, alternating in thin bands of various shades of brownish-red and pink. It is said that when the cut was first made these colors appeared on the surface. Now one generally has to break a fresh surface to see them. Not a great deal of the section is shown here and the fossils are best obtained from the loose blocks in the cut.

The fauna consists of: *Pholidops tumida* (aa), *Chonetes hudsonius* (aa), *Anoplia nucleata* (r), *Beachia suessana* var. *immatura* (r), *Spirifer tribulis* (a), *S. tribularius* (r), *Anoplotheca flabellites* (aa), *Meristella lentiformis* (rr), *Tentaculites acus* (rr), *T. elongatus* (rr), *Platyceras* small species, ostracods and a fish spine.

A few yards to the west of the exposure of the Helderberg at Cash Valley near Cumberland the black chert of the Shriver Chert member is taken out for road metal. It is weathered to a yellowish or brownish mixture of clay and sand. This is one of the best places to secure the fossils of this member, but the specimens and species are few in number. They include: *Pholidops multilamellosa, Chonetes hudsonicus, Beachia suessana* var. *immatura, Spirifer paucicostatus, S. tribulis, S. tribuarius, Anoplotheca flabellites* (c), and *Tentaculites acus.*

III. Section at Devil's Backbone

The remarkable section of the Helderberg at the Devil's Backbone has been described on preceding pages. An excellent exposure of the Oriskany is also to be seen at this place. The section is as follows, according to the measurements of Schuchert:

Oriskany Formation

	Vertical thickness feet	Total vertical thickness
Ridgely Sandstone Member		
Chiefly dark gray, massive, arenaceous limestone. In the upper portion *Anoplotheca flabellites* (aa), *Spirifer arenosus* (a), *S. murchisoni* (a), *Stropheodonta magnifica* (a), and *Hipparionyx proximus* (a) occur. In the lower portion *Spirifer intermedius* (aa), *S. cumberlandiæ* (aa), *Anoplotheca flabellites* (aa), *A. fimbriata* (a), *Chonostrophia complanata* (rr), and *Anoplia nucleata* (c)	130.0	246.0
Shriver Chert Member		
Bluish-black cherty to dark gray arenaceous limestones, heavy-bedded above, passing below into thinner beds. In the upper portion *Spirifer tribulis* (r), *S. paucicostatus* (r), *Anoplotheca flabellites* (aa) occur. In the lower portion *Anoplotheca flabellites* (a) occurs	116.0	116.0

IV. Sections near Ridgely

At Miller's Station, about 1 mile south of Ridgely Station, on the West Virginia Central Railroad, there is a considerable talus from the Oriskany cliffs above. The rock has disintegrated and many fossils can be collected, especially the strophemenoid shells that are very scarce at the other Oriskany collecting grounds. Some blocks of the Helderberg also are in the talus slope, but they can be easily distinguished. The following species were obtained from the Ridgely member of the Oriskany: *Spirifer arenosus* (aa), *S. cumberlandiæ* (r), *S. angularis* (a), *Meristella lata* (rr), *Rensselæria marylandica* (r), *Beachia suessana* (aa), *Anoplotheca flabellites* (c), *A. fimbriata* (r), *Eatonia peculiaris* (r), *Plethorhyncha speciosa* (r), *Leptæna rhomboidalis* (r), *Stropheodonta magnifica* (c), *S. magniventra* (r), *Chonostrophia complanata* (c), *Chonetes rowei* (r), *Dalmanella planiconvexa* (r), *Orbiculoidea ampla* (rr), *Megambonia lamellosa* (rr), *Megambonia* sp. (rr), *Avicula recticosta* (rr), *A. textilis* var. *arenaria* (r), *A. textilis* (?) (r), *Platyceras magnificum* (c), *Diaphorostoma ventricosum* (c), *Homalonotus major* (rr), *H. vanuxemi* (rr).

Ridgely at the north end of Knobly Mountain is perhaps the most satisfactory collecting ground for Oriskany fossils about Cumberland. At this point 50 or 75 feet of the upper part of the Oriskany is exposed. On the right side of the railroad track before one reaches the railroad station,

in a low bank from 5 to 10 feet high, fossils can be seen in considerable numbers and many perfect ones may be obtained.

On the left side of the wagon road, just a few feet beyond the railroad station, is a bank 20 feet or more high from which large collections have been obtained. The formation here dips quite sharply to the eastward and is apparently disintegrated throughout. It contains softer portions parallel to the bedding, usually of small extent, but at times attaining considerable dimensions, that are locally known as "sand-pockets." It is from these that the beautiful specimens of the region are obtained.

A few yards south of Ridgely the West Virginia Central Railroad has begun a cut through the ridge which has been left unfinished. The sand-pockets in this are numerous, sometimes containing fossils and sometimes being perfectly barren. The fossils are very fragile with the tests thoroughly silicified. The extensive weathering which the Oriskany has undergone can be well seen here. In the center of the cut the beds are massive and very calcareous. As they approach the surface on both sides of the ridge they become porous, brown, poorly cemented sandstones.

The northern end of Knobly Mountain gives the following species obtained in the Ridgely member of the Oriskany: *Spirifer arenosus* (aa), *S. murchisoni* (a), *S. gordoni* (r), *S. cumberlandiæ* (r), *S. tribulis* (r), *S. intermedius* (a), *S. perdewi* (r), *Metaplasia pyxidata* (r), *M. lentiformis* (rr), *Anoplotheca flabellites* (c), *A. fimbriata* (r), *Rensselæria marylandica* (r), *Beachia suessana* (r), *B. cumberlandiæ* (r), *B. ovalis* (rr), *Oriskania lucerna* (r), *Eatonia peculiaris* (aa), *E. sinuata* (r), *Plethorhyncha speciosa* (a), *P. barrandii* (rr), *P. pleiopleura* ? (rr), *Rhynchotreta cumberlandica* (rr), *Camarotœchia oriskania* (rr), *Hipparionyx proximus* (rr) *Stropheodonta magnifica* (r), *S. becki* (rr), *Schizophoria oriskania* (r), *Rhipidomella musculosa* (aa), *Dalmanella planiconvexa* (r), *Anomalocystites disparilis* (r), *Tentaculites arenosus* (rr), *Platyceras gebhardi* (aa), *P. ventricosum* (aa), *P. magnificum* (c), *P. tortuosum* (c), *P. reflexum* (r), *P. subconicum* (c), *Diaphorostoma ventricosum* (c), *Cyrtolites* (?) *expansus* (rr), *Dalmanites* sp. (rr), *Favosites conicus* (rr), *Edriocrinus sacculus* (aa) *Technocrinus spinulosus* (rr), *T. andrewsi* (r), *T. striatus* (rr), *T. sculptus* (r).

About a mile to a mile and a half south of Ridgely on the road east of Knobly Mountain, the road-bed dips below three or four layers of the uppermost beds and at some places exposes upwards of 10 feet of soft, dark yellow sandstone. At the base on the right side of the road is a trilobite bed where numerous fine but friable specimens of *Dalmanites multiannulatus* have been gathered. Still farther south along the road the Oriskany-Romney contact and several feet of black shales are seen. The following fossils were obtained in the Oriskany at this place: *Spirifer murchisoni* (r), *Cyrtina rostrata* (r), *Orbiculoidea ampla* (rr), and *Dalmanites multiannulatus* (aa).

V. Section on Williams Road East of Cumberland

About 3½ miles east of Cumberland on the Williams Road an excellent section of the Devonian is exposed embracing the strata from the Oriskany to the Parkhead member of the Jennings formation. The fossils are not abundant in the Oriskany and the species were all collected from the upper 16 feet. The rock is a coarse gray sandstone sometimes gritty and sometimes calcareous. The contact between the Oriskany and the Romney is here splendidly shown, much better than at Monster Rock and quite as well as at the iron bridge over Licking Creek below Warren Point, Pennsylvania. The section of the Oriskany of this place is as follows:[1]

	Vertical thickness feet	Total vertical thickness
Romney Formation		
Onondaga Member		
Black shales broken into very thin pieces.		
Oriskany Formation		
Ridgely Sandstone Member		
Coarse sandstone sometimes gritty and sometimes calcareous containing *Spirifer arenosus* (r), *S. tribulis* (c), *Metaplasia pyxidata* (a), *Cyrtina rostrata* (r), *Anoplotheca flabellites* (r), *Meristella lata* (r), *Rensselæria marylandica* (r), *Beachia suessana* (r), *Plethorhyncha speciosa* (r), *Chonetes hudsonicus* (r), *Anoplia nucleata* (r), *Rhipidomella musculosa* (r), *R. marylandica* (r), *Dalmanella planiconvexa* (aa), *Schuchertella becraftensis*, *Diaphorostoma ventricosum* (rr), *Cyrtolites expansus* (rr)	40.0	40.0
Concealed.		

[1] Measured by R. B. Rowe.

VI. Section at North Branch

The black chert beds of the Shriver Chert member of the Oriskany with a portion of the arenaceous Ridgely member above them are exposed at the south end of Nicolas Mountain on the Oldtown Road about 1 mile east of North Branch Station. The exposure is not complete enough to give either the top of the Helderberg or the Oriskany-Romney contact. This and the Winchester Road exposures are among the best for fossils of the Shriver Chert member. The rocks are in the center of an anticline which is more plainly shown on the south side of the river.

Oriskany Formation

Shriver Chert Member	Vertical thickness feet	Total vertical thickness
Light gray sandstone with much black chert in nodules and thin layers. *Spirifer murchisoni* (aa), *S. arenosus* (a), *Metaplasia pyxidata* (aa), *Anoplotheca flabellites* (aa), *A. fimbriata* (r), *A. dichtoma* (c), *Meristella lentiformis* (r) ?, *Schuchertella becraftensis* (rr), *Chonetes hudsonicus* (rr), *Orbiculoidea ampla* (rr), *Lingulapholis terminalis* (c)	100.0	185.0
Black or blue chert in nodular and lenticular masses with considerable arenaceous material. *Spirifer tribulis* (a), *S. arenosus* (?), *Meristella lentiformis* (aa), *Anoplotheca flabellites* (aa), *Anoplia nucleata* (r), *Eatonia medialis* (r)	10.0	85.0
Black or blue-black chert in nodular and lenticular masses containing *Spirifer tribulis* (aa), *S. paucicostatus* (r), *Meristella lentiformis* (rr), *Stropheodonta arctimuscula* (r)	75.0	75.0
Thickness of Shriver Chert member	185.0	

VII. Section near Collier's Run

On the east side of Nicolas Mountain, about 300 yards above the Romney-Oriskany contact near Collier's Run on Williams Road, is an excellent place for collecting Oriskany fossils. The following fossils were obtained here: *Spirifer arenosus* (a), *S. intermedius* (r), *S. cumberlandiæ* (a), *S. tribulis* (rr), *Metaplasia pyxidata* (a), *Anoplotheca flabellites* (a), *A. fimbriata* (r), *Rensselæria marylandica* (a), *Beachia suessana* (c), *Plethorhyncha speciosa* (c), *P. pleiopleura* (r), *Eatonia peculiaris* (aa), *E. sinuata* (rr), *Stropheodonta magnifica* (r), *Rhipidomella musculosa* (a), *Platyceras gebhardi* (a), *P. ventricosum* (a), *P. nodosum* (c).

VIII. Section at Tonoloway

The Oriskany sandstone is well exposed in the cut of the Western Maryland Railroad at Tonoloway, opposite Great Cacapon, West Virginia. The following section was measured by G. W. Stose and E. O. Ulrich.[1]

	Vertical thickness feet	Total vertical thickness
ROMNEY FORMATION		
Onondaga Member		
Black and drab shale.		
ORISKANY FORMATION		
Ridgely Member		
Soft, porous, brown fossiliferous sandstone, some beds a fine dark vitreous quartz conglomerate. Very fossiliferous layer at base	40.0	417.0
Massive beds, 10-20 feet thick, of white fossiliferous quartzose sandstone	85.0	377.0
Softer, thinner-bedded, fossiliferous sandstone, weathering yellowish	90.0	292.0
Hard, quartzose sandstone	2.0	202.0
Soft, thin-bedded, yellowish sandstone. Few fossils	45.0	200.0
Covered. Soft sandstone débris	140.0	155.0
Thickness of Ridgely member	412.0	
Shriver Chert Member		
Yellow, probably calcareous, fossiliferous shale with much chert, containing Oriskany fossils	15.0	15.0
Thickness of Oriskany	417.0	
HELDERBERG FORMATION		
New Scotland Member		
Residual clay often limestone filled with white blocky chert. Fossiliferous	12.0	....

The thickness of the Oriskany at this locality is greater than that observed elsewhere in Maryland. The usual thickness in the Cumberland area is about 350 feet, while on Elbow Ridge, but 15 miles northeast of this place, it is but 52 feet thick. The beds also change from a calcareous sandstone near Hancock to an arenaceous limestone in the eastern section.

[1] Pawpaw-Hancock Folio, U. S. Geol. Survey, 1912, p. 9.

IX. Section at Hancock

About 1½ miles west of Hancock Station, on the West Virginia side of the Potomac, is the Hancock White Sand Works. Here the Oriskany is a pure white sandstone, sometimes a little gritty. At its most extensive outcrop, known locally as "Lovers Leap," about 130 feet is exposed, the remainder being covered by talus. Some of these sandstone beds are very fossiliferous while others are comparatively barren.

Beautiful white casts of the following fossils were obtained here: *Spirifer arenosus* (aa), *S. murchisoni* (rr), *S. intermedius* (rr), *Rensselæria marylandica* (aa), *Beachia suessana* (r), *Eatonia peculiaris* (rr), *Plethorhyncha barrandii* (rr), *Diaphorostoma ventricosum* (aa), *Platyceras magnificum* (c), *P. tortuosum* (r), *Megambonia lamellosa* (r), *Homalonotus* sp. (rr), *Megistocrinus* sp. (c).

The origin of these glass-sand pockets in the Oriskany, of which this is an especially large one, is a matter of interest. The rock is almost pure silica and must have been thoroughly washed at the time of the deposition or by infiltrating waters which have carried away the iron and other impurities found in the Oriskany elsewhere. It may also be a combination of both methods. Certainly in this region the wave-work must have cleaned the sand to some extent for it is a very white and pure sandstone over a considerable area, *i. e.*, as far west as Tonoloway Hill. Since, however, that portion fit for glass sand is only found in pockets and limited lenses and is much softer than the rest, it seems probable that the percolating waters carried away the calcareous cementing material and such other impurities as exist in the rock surrounding these pockets and lenses.

X, Section at Warren Point, Pennsylvania

Both the Helderberg and Oriskany are exposed at this place. Under the south end of the iron bridge over Licking Creek the following short section is shown with the Oriskany-Romney contact.[1]

Romney Formation

Onondaga Member

Black and gray argillaceous and arenaceous shales with a basal conglomerate. *Ambocœlia umbonata* (r), *Rhipidomella cyclas* ? (r), *Styliolina fissurella* (a), *Phacops rana* (r).

[1] Measured by R. B. Rowe.

ORISKANY FORMATION	Vertical thickness feet	Total vertical thickness
Dark blue arenaceous limestone with bands of fine conglomerate or grit. These bands are sometimes several inches in thickness and consist of coarse sand with calcareous cement. At the top are 5 or 6 inches of coarse heavy conglomerate, with large smooth quartz pebbles. *Rensselæria marylandica* (r), *Spirifer murchisoni* (r), *Plethorhyncha barrandei* (r).....	13.0	18.0
Dark blue limestone with layers of black chert.....	5.0	5.0
Covered.		
Thickness of Oriskany formation exposed.....	18.0	

This is the best exposure of the Oriskany-Romney contact to be seen in this region, and adds considerable to the evidence we already have of a temporary land area at the close of the Oriskany. The conglomerate at the top of the Oriskany was formed when the land was rising and the basal conglomerate at the bottom of the Romney was formed while the land was sinking at the beginning of Romney deposition. The upper conglomerate of the Oriskany was only partially destroyed by erosion during its emergence and pebbles derived from this upper conglomerate are found for several feet in the base of the Romney.

On the north side of the creek about one-quarter of a mile east of the north end of the bridge the same succession is shown in several small abandoned quarries. The section[1] there is as follows:

ROMNEY FORMATION *Onondaga Member*	Vertical thickness feet	Total vertical thickness
Black and gray argillaceous shale.		
Covered.		
Massive coarse conglomerate with large pebbles. Base of the Romney	0.5	65.0
ORISKANY FORMATION		
Massive coarse conglomerate, with large smoothly worn quartz pebbles, containing Oriskany fossils.....	1.5	64.5
Massive light gray limestone with bands of conglomerate or grit near bottom. Conglomerate bands are several inches in thickness and consist of small pebbles and coarse sand. *Spirifer arenosus* (r), *S. murchisoni* (c), *Meristella lata* (aa), *M.*		

[1] Measured by R. B. Rowe.

	Vertical thickness feet	Total vertical thickness
gigantea (a), *Rensselæria marylandica* (c), *Beachia ovalis* (rr), *Stropheodonta magnifica* (rr), *Leptæna rhomboidalis* var. *ventricosa* (r), *Chonostrophia complanata* (rr), *Dalmanella planiconvexa*, *Lingulapholis terminalis* (rr), *Avicula textilis arenaria* (rr), *A. gebhardi* (rr), *Diaphorostoma ventricosum* (rr), *Platyceras nodosum* (r), *P.* cf. *gebhardi* (a)	12.0	63.0
Covered	10.0	51.0
Light gray massive arenaceous limestone	8.0	41.0
Covered	2.0	33.0
Heavy dark gray limestone with conglomeratic bands at top. Bands four or five inches thick consisting of small quartz pebbles and coarse sand. *Diaphorostoma ventricosum* (rr)	10.0	31.0
Covered	6.0	21.0
Conglomeratic dark gray limestones. Fine pebbles and coarse sand throughout this limestone	3.0	15.0
Total thickness of Oriskany formation	52.5	

Helderberg Formation

Becraft Member

Light gray massive limestone. *Spirifer concinnus* (aa), *S. cyclopterus* ? (r), *Meristella arcuata* (c), *Schuchertella woolworthana* (rr)	12.0	12.0

The Oriskany consists of about 52 feet of limestone with scattered beds of coarse sand and also some layers of black chert. This is in very strong contrast with the Oriskany exposed at Hancock, only a short distance farther west, where it is almost pure silica throughout. The conglomerate at the base of the Romney is much heavier than that in the same position on the south side of the creek.

LIFE

Richard Burton Rowe was born at Clarksville, New York, May 3, 1872. He received his early education at the village school and at Grammar School No. 11, Albany. In 1889 he entered the Albany High School and was graduated in 1892. Entering Union College, in the fall of that year, he received the degree of Ph. B. in 1896. The year 1896-1897 was spent as an assistant in the Geological Laboratory at Union College. In the fall of 1897 he entered Johns Hopkins University, where, the first and second years, he received an assistantship and the third year a Fellowship. The summers of 1897, 1898, and 1899 were spent on the Maryland Geological Survey.

Richard Burton Rowe died May 26, 1902.